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Sight Conservation in the Local Health Program*

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SHOWS the correlation of voluntary sight conservation work with the work of local health units as parts of departments of health.

THIS is the centennial year of the modern public health movement. By this I mean the social effort of democracies to include within the framework of representative civil government the functions of a public service based upon a steadily and rapidly expanding knowledge of the sciences of human biology and their application through the arts of medicine.

Following the classical "Survey of the Sanitary Condition of the Laboring Population of Great Britain," in 1842, by Edwin Chadwick and his medical associates, especially Dr. Southwood Smith, the first national health act of the British Parliament was passed in 1848. This act declared it to be a function of the national government to protect the health of the people by controlling preventable factors of environment, employment, and social relationships. Out of this, and the comparable study by Lemuel Shattuck, of Boston, and the creation of the Massachusetts State Board of Health a decade later in this country, has grown the formidable, widespread, and yet still inadequate and incomplete structure of national, state, and local health organization as we know it in this and other occidental nations today.

For the past forty years of sanitary progress, the National

* Excerpt of address presented at dinner meeting of the 1948 National Society for the Prevention of Blindness Conference, Minneapolis, Minnesota, April 6, 1948.

Society for the Prevention of Blindness has played the rôle of public conscience, scientific critic, and professional initiator of social and governmental, voluntary and official effort in that special field which deals with *vision*, not only of the eye as a special sense organ but of the seeing mind and imagination, the hopes and ambitions of mankind. You have devoted yourselves to opening and keeping open, to cleaning and using the windows of man's being, his eyes—those gifts of evolution and, if you will, of divine power which have brought the most remote stars into our studies and libraries and have penetrated into the formerly invisible depths of Nature's ultramicroscopic secrets.

Basic Functions of the Health Department

Wherever organized efforts are made to strengthen the usefulness of the practice of medicine for prevention and care of sickness by the authority and resources of civil government, we find the half-dozen basic functions of local public health departments attempted, according to the will and the ability of the tax-paying public to command competent leadership and the associated workers to translate knowledge into service.

Let us enumerate these basic functions, if for no other reason than to emphasize the simplicity of the structure of public health organization and the infinite potentialities of its useful development to meet ever-expanding demands of content and technique: (1) vital statistics; (2) communicable disease control; (3) environmental sanitation; (4) public health laboratory; (5) maternal, infant and child hygiene; and (6) health education.

You see that there are two orders of resources included under these few functional titles: (1) the uses of authority under state statute or local sanitary ordinance, i.e., the exercise of the police power of the health department; and (2) the persuasive application of information to influence citizens toward self-preservation and the protection of their families, fellow-workers, and neighbors.

These are really the only two resources of local health departments, or, in fact, of any agency attempting to put to social use the resources of preventive medicine: authority under the law and education.

Causes of Blindness

We can deal briefly with two elements involved in your Society's aims, i.e., the prevention of visual defects and the protection of normal vision, for one; and the location of the services to this end, within one or more of the six functions of the local health department.

Beginning with ophthalmia neonatorum and trachoma, the first preoccupation of your founders in 1908, we can run through a long list of causes of blindness or lesser damages to vision—some readily prevented, others prevented only with great difficulty. They include: communicable disease; malnutrition; occupational hazards; accidents; neoplasms; hereditary and congenital abnormalities; general diseases; poisons; and eye conditions of middle and old age.

Among causes of blindness in children, the 23 per cent due to communicable diseases is preventable by authoritative control chiefly, supplemented by education.

Of the causes related to trauma and poisons, many are of occupational origin and subject to sanitary control.

Of the 55 per cent of prenatal origin, but few are hereditary in nature and not clearly preventable, in the great majority the origin being obscure and awaiting more knowledge of genetics, the physiology and pathology of pregnancy, the causes of prematurity, the nutritional factors in the embryo, and the damage following any infection of the mother in early pregnancy.

Relation of Health Department to Sight Conservation

It must appear to any local health officer that the problem of sight conservation resolves itself into: (1) searching for and recording all persons with defective vision, in the course of the existing contacts with persons and families for other health purposes; (2) analyzing the causes (preventable and non-preventable); and (3) dealing directly with those believed to be preventable by exercise of authority over persons or premises or occupations, and by planned education in sight protection as a part of an intelligent way of living.

The problem administratively does not necessarily involve the creation of a new line of services. But it does involve the inclusion of well-understood principles of control and health education in

sight conservation within the activities of local health departments, under the existing half-dozen accepted functional divisions of a well-balanced health program. In this, every member of office and field staffs has a responsibility.

At this point it may not be amiss to remind you of the very considerable weakness of the local health department situation across the nation. At present 35 per cent or some 40,000,000 of our fellow citizens and neighbors live in communities where even such simple inexpensive basic local health service is lacking.

Development of Local Health Units

It is my own conviction that it is the manifest obligation as well as opportunity of the members of the staff and subscribing supporters of every voluntary health agency in the United States to devote systematically, a share of their time, attention, and public influence to the creation of units of local health jurisdiction, of such size as to be economical and efficient in operation. Without indulging in details, let me say that in only five states is local health service under trained medical direction on a full-time basis, and the local health department staffed with suitable numbers and kinds of personnel, organized for the state's total population. The local representatives of agencies responsible for prevention of blindness should be aware of the situation in their respective states and make conscious efforts toward a remedy of our greatest factor in national health unpreparedness.

There are a few essential social mechanisms desirable, as for instance: (1) the establishment of 48 state public health councils (these are now well developed in a number of states); (2) a plan by each state health department for coverage of the state with local health units, supported by local resources primarily, but supplemented where necessary by state and federal aid; (3) the creation of a local health council for each county, city-county, multicounty, or district unit of local health jurisdiction, recommended in the state plan; and (4) the development of popular and professional demand for the state plan for total local health coverage.

It is well to remember that professional public health opinion is unanimous on the question of size of population desirable for the least of such local health units and on the minimum staff necessary

for providing the most modest performance of the six basic services of health protection for the community. The smallest population is 50,000 persons, and the desirable staff is 16 full-time persons: the medical officer of health; the public health engineer and one non-professional assistant; ten public health nurses (one of them of supervisory grade); and three clerks. The cost will be not less than $1.50 per capita population, on the average, in the United States today.

Without such local health units (1200) serving all the population in every square mile of our national area, the responsible national voluntary auxiliary agency in sight conservation will suffer delay; waste of money, time and effort; and, to some degree, frustration. For the voluntary agency cannot, by any device or money resources, substitute for the organization, the structure, the functions and the personnel of the local health department.

With local health units organized everywhere, there will be facilities through which prevention of blindness work can become effective at the least expense to the voluntary contributor and with optimum benefits to the population.

Public health makes progress only when the system of retail distribution of services is available, person-to-person, family-to-family, shop and school, nursery, playground and business office included. This matter of public health is a joint undertaking of the public and its local government and the efforts of agencies supported by voluntary services and funds.

I recommend to you the adoption, as part of your own campaign for sight conservation, of a concerted effort, with the central guidance of the National Health Council, to have local units of public health services organized for, and supported by, every community in our country, according to plans publicly declared and adopted by the respective state health departments.

Summary

Sight conservation is one of the specialized subjects of primary importance in a balanced public health program. Without the organization of local health units, ready for efficient and economical public service for every community in our country, the full value of voluntary effort will not be obtained. With such units, the activi-

ties contributing directly to the conservation of vision can be carried out through each of the basic divisions of each health department through the use of: (1) the records of births, deaths, and sickness for statistical analyses; (2) department policy and public information; measures for the control of the significant communicable diseases; (3) the authority of sanitary inquiry and control of environment to protect the structure and function of the eyes; (4) the diagnostic and research resources of the public health laboratory to make still more productive and precise the control of communicable diseases and of environmental sanitation; (5) the maternity, infancy and childhood divisions, against a multitude of nutritional, developmental and accident hazards; and (6) the full power of education to help people to protect their own eyes and eyesight.

Conclusion

In closing let me remind you that mental vision is as essential as ocular vision. Lincoln had this to a rare degree, and particularly in his definition of the limitation upon the function of government "to do only those things for the people which they cannot do at all, or as well, themselves."

While assembled here to pay tribute to the constructive social undertaking of our predecessors and to lend encouragement and confidence to their continuing efforts in the future, let us agree that the individual is the strength of any social movement and that our own country is not safe in the sense of public health until every person, family, and community are included under the services of the medical sciences.

Prescriptions for Occupational Glasses*

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DESCRIBES how safety glasses can be prescribed to make the eye fit the job.

THE ophthalmologist in industry may be engaged full time or as a consultant. In either case, if he is to give proper occupational glasses, a careful visual job analysis of the entire industry is desirable. Such an analysis is best made by use of a work sheet, such as the one developed by the National Society for the Prevention of Blindness, called "Analyzing Visual Tasks."

Among the industrial operations, the following typify the variety that may be encountered:

1. A crane operator in the shipyard who needs distance acuity, depth perception and normal distance muscle balance. Bifocals are contraindicated.
2. The lathe operator often has to read a micrometer at 8 inches. His bifocal takes the form of a flip-up goggle adjusted for 8 inches instead of the usual reading distance of 14 inches.
3. The electrician needs visual acuity and color appreciation.
4. Fingerprint classifiers use a magnifying glass in one hand. The correction has no relation to the magnifying glass.
5. Small parts assembly requires near vision and color appreciation. Special work glasses are desirable.

In correcting visual defects in industry, the ophthalmologist uses five basic categories: (1) unaided visual acuity; (2) working acuity with correction; (3) muscle balance; (4) depth perception; and (5) color perception. Using these categories, substandard visual per-

* Presented at the 1948 Graduate Course on Occupational Aspects of Ophthalmology of the New York University College of Medicine, New York, N. Y., with the cooperation of the National Society for the Prevention of Blindness.

formance runs about 10 per cent of the defects which require attention. They are defects of 20/100 or less in one eye, a squint, or a pathological condition. Thus among 20,000 employees at the Sperry plant, about 3,000 were found who needed real help. Statistically we found the visual standards we set closely matched those shown by nature in its ever-effective process of survival of the fittest. It is pertinent to mention that the screening tests overlooked glaucomas, brain tumors, optic atrophies, and retinal hemorrhages.

Analyzing Visual Tasks*

This check list will give a rough analysis of the nature of visual tasks:

Except where numbers or descriptions are called for, check in brackets (✓).

1. **Job Description:** If available, use standard job description code no._____. If code no. not available, give title, machine to be operated or material to be worked with:_____

2. **Work Distances:**_____ (inches) _____ (feet) Fixed ( ) Changing ( )

3. **Central Working Area:** Size_____ Fixed ( ) Changing ( ); **Depth:** Gross ( ) Fine ( ) Flat ( ); **Moving:** Rapidly ( ) Slowly ( ) Vertically ( ) Horizontally ( ) Rotating ( ) Constantly ( ) Intermittently ( ) Fixed ( ); **Illumination** at Work Point:_____ (foot candles)
   If not measured: Bright ( ) Dim ( ) Glares ( )

4. **Field Outside of Central Area—Depth:** Gross ( ) Fine ( ) Flat ( ); **Shape:** Vertical ( ) Horizontal ( ); **Illumination:** Direction ( ) Bright ( ) Dim ( )

5. **Colors to be Perceived and Discriminated:** All Colors and Shades ( ) Red and Green only ( ) Blue and Yellow ( ) None ( )

6. **Detail for Discrimination:** Fine ( ) Gross ( ) Continuous ( ) Occasional ( )

7. **Visual Attention Required—Concentrated:** Continuous ( ) Intermittent ( ); **Casual** ( )

8. **Hazards**—Describe nature: Chemical_____
   Physical_____ Radiation_____

* This check list was developed by the National Society for the Prevention of Blindness.

The visual acuity of the same person varies on different jobs and on the screen test. It is the duty of the eye doctor to go into the plant and check the acuity at the job. Surprising results are often found. After the age of 40 there is an increase in visual defects for near visual acuity and muscle balance. Work distances for exacting jobs are fixed. With their own glasses these people will assume all sorts of postures and have numerous backaches, but with glasses corrected for the work distance these people assume natural relaxed positions.

Occupational Correction

When we speak of occupational correction, what do we mean? We mean we are attempting to restore the normal visual relationships which are disturbed by abnormal work distance. We are seeking maximum eye comfort and efficiency.

The importance of direct measurement of the pupillary location at working distance and with respect to the bridge of the nose cannot be overestimated. Because of the effect of possible muscle anomalies, this measurement should be made with the eyes directed as they would be when fusing at working distance. This is in contrast to computing the probable measurement from interpupillary distance for far vision.

In ordinary life we read at 14 to 16 inches, but often in industry the work may be located only 6 inches away. This produces special problems of the relationship between muscle and size of object. We use magnification and prisms to correct the abnormal relationship and thus obtain fusion at the near point. This magnification may take the form of vocation bifocals or trifocals. A tinted lens is often desirable where there is excessive glare.

Frequently phorias are found at special work distances when there are none at the usual reading distance. A myope with full distance correction will often accommodate too much with that correction for near.

Astigmatic errors must be corrected with considerable judgment as to whether the full or partial correction can be given. In general, the more able the patient is to adapt himself, the fuller the correction he will take. If the patient is satisfied with the wrong theoretical axis, it may be just as well not to change it. A person with

a difference of over 3.00 diopters between the correction in each eye is often best considered a monocular case.

Compromise glasses are usually bad. The patient does not see well for near or far. We should educate people to bifocals and later to trifocals.

Job placement offers a solution when complicated near-work problems cannot be helped by optical means.

The mechanics of the fitting of bifocals and the adjustment of frames along with the proper use of the interpupillary distance is invaluable in dispensing. If an unequal distance is obtained by positioning one glass farther from the eye than the other a dissimilarity in size of optical images results.

Often we need an "upside-down" segment where there are high dial or high thermometer readings. The ear, nose, and throat doctor uses an upside-down segment as his occupational glass. The flip-up plus glass is often the solution in place of a bifocal when the micrometer has to be read only a few times a day.

The use of plastic frames for bifocals is bad for if one has to make a change in tilt this is impossible.

Bifocals should not be used by crane operators or drivers of electric speed trucks. They are dangerous when aisles are small. Clip-ons are better.

Occupational Orthoptics

Occupational orthoptics is valuable in industry just as in private ophthalmology. The near-point convergence, the near-point acuity, the degree of exophoria and the ductions are all essential measurements. The hemoglobin, blood pressure, and the possibility of toxic foci are also important. A knowledge of these, together with good judgment, will make good occupational glasses. About 28 out of 35 applicants who are rejected can be salvaged by these methods.

Ophthalmologists cannot do all the refracting, but they can have trained refractionists who can do good work. We had 15 good optometrists at Sperry Gyroscope when I was the ophthalmologist there. We frequently gave Base-In prisms, high cylinders, and custom-built frames.

The alignment of a system of lenses has almost as much to do with the effect of an optical system as the lenses themselves. Fre-

quently industrial glasses with special work prescriptions have been checked by technicians or others who were not aware of the special purpose of the prescription. This can lead to criticism and con-

Prescription for Occupational Eye Wear*

℞ Name_____ Date_____

Address_____ Age_____

		Sphere	Cylinder	Axis	Prism	Base	P.D.†
Distance	O.D.						
	O.S.						
Work Distance ( )	O.D.						
	O.S.						
Near	O.D.						
	O.S.						

TYPE OF LENS

Hardened_____

Tint_____

Type of Frame_____

† From crest of bridge, each eye at each distance.

_____, M.D.

EMPLOYEE'S NOTICE

Glasses are to be worn for { work only_____ / street wear_____ / reading_____

Keep glasses clean and free from fogging—use the goggle-cleaning station as often as necessary.

Have frame adjusted whenever bent, and check for comfort.

Return visit re-check_____.

_____, M.D.
Director, Medical Department

* Suggested form developed by the National Society for the Prevention of Blindness.

fusion. For this reason I have suggested to optical companies that every industrial glasses case should carry a printed notice to the effect that the glasses contained therein were for industrial use, and that the prescription, if any, is for working distance which, in many cases, will be other than reading distance.

These people and some 10,000 others who had prescription protective glasses and plano protective glasses had to have constant service on their frames. Such service is an indispensable part of the successful program.

Color Vision and Color Vision Testing

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EXPLAINS the function of the rods and cones in the process of seeing; analyzes the physical basis of color; presents the various theories of color vision; and describes various tests for color blindness.

Introduction

Vision is one of the most remarkable of body functions. It represents a highly complex process by which light illuminates objects in the outside world and is then transmitted to the eye where images of these objects are formed upon the retina. The two elements involved are the rods and the cones.

The rods have to do with *black and white vision* and with *form vision* in dim light. They are located chiefly in the periphery of the retina, although some may be present centrally in modified form. The rods contain a substance called "visual purple." This is bleached by light and then reformed. In this process lies some of the mechanics of seeing.

The cones have to do with *vision for color* and with *vision in bright light.* They are located in the greatest number in and around the center of the retina in an area called the fovea. This is a depression in the retina at a point where there is a yellowish area called the macula lutea. This is the zone of most acute vision. Toward the periphery of the retina, cones are gradually replaced by rods. There is said to be no visual purple in the cones. Cone vision fails with decreasing light and, therefore, we find that in dim light peripheral vision is better than central vision.

In the process of seeing, light is changed by the rods and cones into another form of electrical energy and is transmitted back from

the eyes via the optic nerves, optic chiasma, and optic tracts to the higher centers of the brain and so to the occipital cortex.

Vision can be broken down into two main categories. The first is *form vision*. This is the ability to see the shapes of objects and to relate these to other objects in space. This is helped by the fact that we have two eyes, thereby getting a stereoscopic effect from binocular vision. The second type of vision is *color vision*. This is the ability to see and recognize upward of 160 different hues. As we shall see, this is a complicated process and all too little is known about it.

There has been much speculation regarding vision and color vision since the time of Aristotle (384–322 B.C.). During the nineteenth century many theories were advanced. World War I stimulated much research. Monumental work by Ferree and Rand[4] and Cobb[1] laid important foundations. World War II, with its emphasis on complex ocular devices, led to an increase in research in this direction. Hardy, Rand and Rittler,[6] Farnsworth[3] and others in this country and Wright,[9] Granit,[5] and Hartridge[7] in England have made many contributions. These studies were made both by individuals and by members of organizations such as the armed services, the Inter-Society Color Council, etc. A vast amount of material has been obtained as to the most accurate method of measuring color vision and color vision deficiency. As yet we are ignorant as to why we see colored objects. There are various aspects to color vision as pointed out by Hecht.[8] Many attractive theories have been advanced, but they are just theories and the subject is almost as mysterious as when Sir Isaac Newton first passed a beam of light through a prism and obtained the spectrum colors. We also have no information as to how to cure people of defective color vision. During World War II many charlatans professed to be able to cure color-blind people. There is no known treatment at present.

The purpose of this paper is to consider the fundamental aspects of color, some common theories of color vision, to classify color blindness, and to discuss some methods of testing for color blindness.

The Physical Basis of Color

White light, an electromagnetic disturbance in space, consists of a mixture of red, orange, yellow, green, blue, indigo, and violet.

When these hues are combined, the result is white light. An object is said to be colored if it reflects light of one of the above hues or if it transmits light of one of these hues. White is total reflection or transmission. Black is total absorption.

The Production of Color

Color may be produced by several methods: the prism spectrum, the diffraction grating, Newton's rings, molecular films, color filters, color pigment, and passage of electric current through gas.

1. The Prism Spectrum.—When a beam of light is passed through a prism, we obtain the seven elementary hues of light. Thus light may be broken down into its component parts and, by blocking out all but one hue, we obtain a desired color.

2. The Diffraction Grating.—The passage of light through a piece of glass on which have been drawn thousands of fine lines at right angles to each other produces the spectrum colors.

3. Newton's Rings.—In 1675 Newton showed that the passage of light through two pieces of glass separated by an infinitely thin layer of air produced colored rings.

4. Molecular Films.—When light passes through films of molecular thinness (i.e. soap bubbles, glycerine bubbles, oil on water) spectrum colors are produced.

5. Color Filters.—A filter is a screen that permits light of only one hue to pass through. As a result, we can produce light of a single color. A red filter allows only red light to pass.

6. Color Pigment.—When light strikes certain pigments, only one hue is reflected back, and the others are absorbed. Thus the cover of a book is red because only red light is reflected back from it.

7. Passage of Electric Current Through Gas.—If one forces an electric current to arc across the gap between two electrodes in a gas-filled tube, a color is produced, depending upon the gas. Thus mercury vapor produces a green-blue light, neon a red light, etc.

Primary Colors

It has been known for a long time that by using only three hues and combining them with black and white we can produce a multitude of shades. Although artists do not consider black and

white as colors (feeling as they do that white is the total combination of spectrum hues and black the absence of light or vice versa for pigments), for our purposes in studying the psychology of color vision, we can consider white and black as special forms of color. We, therefore, find two primary systems: lights and pigments.

In the system of lights there are red, green, and blue. These are sometimes arranged in the form of a triangle (The Color Triangle). Red and green light can be combined to produce yellow, etc. All three produce white light when mixed together.

Pigments consist of red, yellow, and blue. The combination of all three produces black.

In ophthalmology we combine these primaries because we deal with both light and pigment and because the combination better explains the ability to interpret color in color mixtures. Therefore, our primaries are red, green, blue, and yellow. We consider that red is antagonistic to green, blue to yellow, etc. We also say that red is the complement of green, and vice versa. These facts can be demonstrated by the phenomena of after-images.

After-Images

After-images may be black and white, or colored. If we look at a white object that is brilliantly illuminated and then look at a white surface, we will see the object as a black (opposite of white) image. Whether this is due to a fatigue of the retina, or to a peculiar persistence of retinal stimulation, we have no definite knowledge. If we look at a red object and then look away we see an image of the object that appears green. If the original object is blue, we see it as yellow. Thus we have evidence for suspecting that certain colors are antagonistic to each other.

The Munsell Color Classification

The Munsell color classification is a very useful system which permits us to standardize color in such a way that pigments can be reproduced accurately. In place of a wide variety of names for shades of color, one can substitute numbers. This does away with such poor terms as "warm," "cool," "rich," etc. In this classification three dimensions are used: (1) hue or the "color name" in which various hues have been arranged on a circle in ten equal

steps of color discrimination with complementary colors diametrically opposed to one another. The circle is thought to be horizontal; (2) value which is the relation of a hue to a gray scale running from white to black, with white at the top in the center of the circle. The term "value" distinguishes a lighter from a darker color and matches this to the scale; and (3) chroma, which refers to the strength or intensity of a hue as one leaves the gray scale in the center of the circle and passes out horizontally. The more intense colors are at a distance from the center of the circle.

The Munsell color classification permits us to construct a color tree of three dimensions. It helps us to visualize the many permutations and combinations possible in the realm of color.

Theories of Color Vision

The theories of color vision have been grouped into three general sections, depending upon the number of elementary primaries believed necessary for complete color vision. The theory is called trichromatic if one considers only three elements essential; tetrachromatic if four are needed; and multichromatic if more are needed.

Trichromatic Theories.—According to Young-Helmholtz, there are in the cones three substances that respond to red, green, and blue. When light reaches the eye, it is broken down to these three elementary hues and the total color is resynthesized in the brain. When all three substances are stimulated, the result is the sensation of white. Black is the absence of stimulation. Color vision is, therefore, a function of three variables.

The Kries theory of zones assumes that there is a three-color mechanism in the retina plus a black and white mechanism, and that synthesis of color takes place in the higher centers.

According to McDougall's theory, there is in the cones a trichromatic mechanism (red, green, and blue) with a white mechanism in the rods. There are four corresponding mechanisms in the brain.

According to Roaf's theory, there are three sets of receptors in the rods and cones. The first receptor is stimulated by the entire visible spectrum. The second is stimulated by the long and medium waves. The third is stimulated by long waves only. A further

differentiation is achieved by a set of filters in front of these receptors. Yet there is no evidence for this.

Tetrachromatic Theories.—The opponent theory of Hering was developed by him in the late nineteenth century. He provided for four primaries by postulating that there are six mechanisms in the retina that can be divided into three groups: (1) red-green; (2) blue-yellow (both of these combinations being provided for by the cones); and (3) black-white (taken care of by the rods). There is a reciprocal process of breakdown and regeneration between these components of each system. Thus provision is made for all possible color combinations. This is a useful theory, because it takes yellow into consideration and helps us to unite pigment and light into our hypothesis. It also is a further explanation for the observed phenomena of after-images.

Ladd-Franklin's theory assumes that in the far periphery of the retina black and white are seen as a rod reaction. As the middle portion of the retina is approached in the region where rods and cones are mixed, blue and yellow are seen. In the center of the retina, where cones predominate, red and green are seen. The differences in our ability to see color in different portions of the retina can be demonstrated by closing one eye and looking at some point of fixation, while a colored pin is moved out from the point of fixation toward the periphery of the retina.

According to G. E. Müller's theory, there are four retinal processes—red, green, yellow, and blue, with a central resynthesis after the impulses reach the brain.

Multichromatic Theories.—Most of these theories are involved, complicated, and not possible to check. Chief among them is that of Edridge-Green. This theory states that light falling on visual purple sets up vibrations of corresponding amplitude which are transmitted to the brain via the optic pathways.

Anomalies of the Color Sense

Anomalies of the color sense may be divided into either deficiencies in the color sense or perversions of the color sense.

Deficiencies in the color sense (color blindness) may be congenital or acquired. The cause of congenital color blindness is unknown. In general, it is said that 4 per cent of males and 0.4 per cent of females

have the condition. The disease is of a male sex-linked character, being recessive in the female. A few cases have been reported wherein the reverse was true. Acquired color blindness may be induced by poisons, toxic chemicals, etc.

Perversions of the color sense (chromatopsia) are rather rare. "Red sight" (erythropsia) may occur if a person's eyes have been flooded with bright light while he is in the snow. It may also be noticed when the pupils are dilated in bright light; but these conditions are temporary. "Blue vision" (cyanopsia) may be noted for a time after a cataract extraction. "Yellow sight" (xanthopsia) may occur during an attack of jaundice.

Classification of Color Blindness.—Various classifications of color blindness have been made. The classification of trichromatic vision is based partly on that given by Duke-Elder,[2] according to the classic Young-Helmholtz theory.

Trichromatic vision is the normal condition in which color vision is a function of three variables. However, it is perfectly possible to have trichromatic vision under certain conditions only. Thus one can have disturbances in this vision that would interfere with our normal interpretation of color. For this reason we divide trichromatic vision into three parts: (1) normal; (2) anomalous, in which one or more of the processes are weak; and (3) low discrimination, in which all processes are weak.

In anomalous trichromatic vision, although color vision is a function of three variables, the relative qualities of the color mixture differ from normal. Where there is a relative failure in the appreciation of red or green we have: (1) protanomaly, or partial protanopia or "green sightedness" or "red weak"; (2) deuteranomaly, or partial deuteranopia or "red sightedness" or "green weak"; and (3) tritanomaly or partial tritanopia, or "blue-yellow weak." These represent a transition stage between the normal and the dichromat.

In dichromatic vision, color vision is a function of two variables. We may classify three types of dichromatic vision depending upon the sensation that is absent (red, green, or blue): (1) protanopia ("green sightedness," formerly called red blindness) in which a person will match a blue-red to a dark green, and the first process is gone; (2) deuteranopia ("red sightedness," formerly called green blindness) in which a person will match a blue-red to a pure light

green, and the second process is gone; and (3) tritanopia (formerly called "violet blind" or blue-yellow blindness). Here the third process is gone.

The dichromat can match all the spectral colors with only two primaries. Protanopia and deuteranopia both represent "red-green" blindness of varying degrees.

In monochromatic vision the entire spectrum appears to be of a uniform hue, there being no color discrimination except on the basis of light and dark. Total color blindness (acromatopsia) is rare.

Tests for Color Blindness

There are five general methods of testing for color blindness. They all have some advantages and some disadvantages. One of the chief difficulties in constructing any test is to make the conditions as uniform as possible. Variations in the illumination will cause different results on tests. Much work has been done and is being done to standardize both tests and illumination for tests.

1. Sorting Tests.—The sorting tests consist of (a) wools—best known are the Holmgren and Jennings tests, in which the patient is presented with skeins of colored wool and is asked to match certain colors (the handling of these skeins destroys their usefulness because of soiling); (b) beads—a bead test was designed by Edridge-Green; and (c) cards, which can be shuffled and matched.

2. Matching Tests.—The matching tests include the (a) anomaloscope, which is a device in which one matches green and red light (seen through filters) to a yellow sodium light; and (b) chips, in which the Inter-Society Color Council has devised a series of colored chips that can be used for testing. They have the advantage of being kept clean, as they have a painted surface.

3. Naming Tests.—The naming tests consist of: (a) spectrum, in which the spectrum or various portions of the spectrum can be presented and the hues named; and (b) lanterns, which have great value in testing patients who are to be concerned with signal lights. Various types of lanterns have been designed by Edridge-Green, the Royal Canadian Air Force, and other investigators. Different colored lights are presented to the person being examined and, by adjustments, the poor visibility found in fog, mist, etc., can be duplicated.

4. Discrimination Tests.—The tests include (a) colored filters, which can be used in varying combinations or alone, and various hues of light can be produced; and (b) pseudoisochromatic tests, in which figures and numbers as well as designs can be made by means of colored dots on a background of other colored dots or of varying shades of gray. By varying hue, chroma, and value it is possible to get a great deal of information about both true color blindness and anomalous color blindness. Probably the most familiar pseudoisochromatic test is the Ishihara test, but others have been devised by Stilling, Rabkin, Hardy-Rand-Rittler, etc.

5. Hue and Chroma Series Arrangements.—By the variations of these elements a testing method has been devised to permit a considerable qualitative examination. The two most common are: (a) matching colored discs (unlike ordinary matching tests they represent carefully controlled color qualities); and (b) Farnsworth-Munsell 100-Hue Test, in which the Munsell color circle is used, and 100 hues are arranged to match the circle. Colors are pigment on paper, and have been standardized. The subject arranges these in boxes of 25 such that the colors will match in ascending or descending order. This is an excellent test.

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Treatment Methods for Retinitis Pigmentosa*

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PRESENTS an analysis of the subject of retinitis pigmentosa—symptoms, treatment, and results of treatment; based on the experience of leading ophthalmologists.

IN order to understand the difficulties met in treatment of retinitis pigmentosa, we must know something of the nature of the condition. It is in no sense an inflammatory disease as the term retinitis would imply. It is really a primary pigmentary degeneration of the retina, and it is as a degeneration that it is referred to today. According to Duke-Elder, "It is a disease of unknown etiology, but with a definitely hereditary tendency, characterized by a chronic course and a progressive habit, which although rarely manifest at birth, becomes apparent in childhood and frequently results in blindness in middle or advanced life."

The outstanding characteristic of primary pigmentary degeneration, in consideration of its causation, is heredity. As early as 1861, Liebreich called attention to the prevalence of pigmentary degeneration in families and found in many cases that those affected were children of cousins. For a very complete study of earlier literature on the subject and examples of family trees in as many as seven generations, we are indebted to Nettleship in the early part of this century. A great many reports of this character have appeared in medical literature since that time.

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Those who have studied eugenics know that there are several definite patterns of transmission of hereditary traits, all of which are met in the problem of retinitis pigmentosa:

1. As a dominant characteristic either parent may transmit the disease, with the possibility that half the children will be affected.
2. In the recessive type, by far the larger group, we find that the parents transmit the traits jointly, which accounts for the number of cases which Liebreich found as the result of marriage of cousins. Consanguinity is productive of large numbers of cases which might never appear in marriages with other than blood relatives. The same is true in regard to marriages between two people whose families are known to carry the taint.
3. Sex-linked: In this type, the trait is carried by females in a latent form without actual symptoms, and transmitted to about half of their sons, who have the typical disease. Because of this latter type, we find more cases in males than females.

Other factors which are apparent in the family tree of many of these cases show the degenerative tendency present. Many are myopic. Congenital deafness is not uncommon. Mental aberrations, ranging from low mentality to actual insanity, epilepsy, and anomalies of various organs or of skeletal structure, are likely to be found in affected individuals.

Two other facts should be known concerning the nature of this disease. First, it is one of a group of pigmentary degenerative diseases which have many symptoms and signs in common. Second, a similar picture may develop from inflammatory lesions in the retina and choroid, in diffuse or disseminated choroiditis, due often to syphilis, but may be caused by tuberculous infection or by general blood-borne bacteremia from a focal infection or in the acute febrile diseases.

Symptoms

Symptoms are confined to disturbances in vision, the earliest being nyctalopia or night blindness. This may be present at a very early age, with vision in a poorly lighted place or at dusk becoming increasingly more difficult as the patient gets older and the disease progresses. Next comes interference with the field of vision which becomes increasingly constricted from without, inwards, with the

central vision preserved to the last. Finally, in most cases, this also is gone and blindness ensues. This is usually between the fortieth and fiftieth years of life.

Examination of the eyegrounds shows in the early stages a zone of pigment in the retina more or less confined to the region of the equator of the eye. The pigment accumulations have been likened to bone-corpuscles and in most cases take this rather typical formation. This zone extends both outwardly and inwardly until the whole retina may be covered by a dense network. The retina becomes increasingly paler as the result of atrophy. Atrophy is also shown in progressive pallor of the optic disc. One of the striking changes is the narrowing of the blood vessels, which in the end may become almost thread-like.

These changes are reflected in the fields of vision as taken on a perimeter or tangent screen. An early characteristic finding is a ring scotoma, corresponding to the affected zone at the equator. Isolated islands or blind spots may appear, with coalescence of these areas, with a constant widening of the central band until only a small central area of vision is demonstrable before this too disappears. The clinical course is, then, slowly progressive, but may at times have periods when there is apparent cessation of progression and even temporary improvement in the vision and visual fields.

Treatment

With this rather lengthy review of the nature of the disease under question, it may be more apparent why treatment has up to this time been very disappointing or as Duke-Elder has put it "indeed, may be said not to exist. As usually occurs, however, with every progressive disease of unknown etiology which is incurable, innumerable remedies have been suggested, enthusiastically received, tried out, and then discredited, sometimes with no small psychological and economic loss to the sufferer."

Because of the change in the blood vessels invariably seen as the disease progresses, many of the attempts at treatment were aimed at improving the circulation. To this end, drugs known to be vasodilators such as amylnitrite, nitroglycerin and more recently acetylcholine, have been used. Others have used various injections under the conjunctiva which by their action increase the blood

supply. Because it is known that the retinal vessels dilate somewhat when the anterior chamber is opened, trephining, such as is done in some cases of glaucoma, has been tried. Favorable reports were given on improvement following cataract operation. A more hazardous operation, aimed also at permanent dilation of the arterioles, is by section of the sympathetic nerve supply to the eye. While, as in other forms of therapy, improvement was reported soon after operation in some cases, many more negative results are recorded.

Other forms of therapy, some based on experimental work and others on certain alterations in tissues due to changes in glandular secretions and sex hormones, have been used rather extensively. Pituitary extract, ovarian and testicular extracts have had their champions and some success has been claimed for them. Liver and liver extracts, cod liver oil and the various vitamins have had their day, particularly vitamin A, because of the symptom of night blindness which occurs in vitamin A deficiency. Mixtures of several organs or tissues together, i.e., adrenal, pituitary, liver and retina, were used in Russia by Manyukova as early as 1936. Physical agencies such as galvanic current and x-ray, as well as many other forms of therapy, have been tried.

In the past several years, the Russians have been much interested in "tissue therapy" and it is the reports of Filatov and his associates in the treatment of retinitis pigmentosa that have awakened popular interest and inspired articles in lay journals, as well as stimulated some people to organize special societies and clinics for study and treatment.

Filatov's first reports were on the results of treatment by injection of cod liver oil, in which he said there was improvement in visual acuity for distance, for close reading and in visual fields. This did not always continue but the report stated that repeated courses of injection restored the improvement. Next he reported on implantation of placenta under the conjunctiva in the eye, and got equally good results. When this tissue was implanted under the skin, the first few cases did not show improvement. Equally good results are reported for placental extracts when injected and preserved human liver when implanted subcutaneously. Dr. Dan Gordon, of New York, whose studies of this type of treatment I shall quote, says that later he seemed to prefer aloes extract for

injection, but now seems to favor injections of placental extract and subcutaneous implantations of preserved autoclaved cadaver skin. All of which prompted Dr. Derrick Vail to the use of the term, "Witches' Brew."

Results of Treatment

Dr. Gordon's report, which was given last fall to the American Academy of Ophthalmology and Otolaryngology, is to the best of my knowledge the only available one on tissue therapy in this condition in America. It is based on 200 cases of retinitis pigmentosa, 128 of whom had received sufficient treatment to be included in the analysis. Dr. Gordon said, "Our treatments have included injections of cod liver oil, cod liver oil concentrates, vitamins A, and A and D, and shark liver oil, subconjunctival implantations of placenta, and, in one case, a subcutaneous implantation of human liver. Many of the patients have received more than one type of treatment though not simultaneously. Care was taken not to instill enthusiasm for the treatment in the patients. Many had had prior treatment of various forms, including vitamin A, nicotinic acid, sympathectomy, etc. It was felt that these patients, having been subjected to previous treatments, were now more competent observers and less likely to imagine improvements. At the same time, little stress was placed on reports of subjective improvements which could not be confirmed by the examiner."

Of the 128 patients, 34 seemed to have some apparent "improvement" in at least one eye, either in visual acuity or visual fields; where dark adaptation was studied there seemed to be also some "improvement." There were many claims of subjective improvement in the direction of less trouble from glare, more rapid accommodation, better night vision, less tiring of the eyes, and less fogginess. Several, whose findings were not altered, complained that they were getting worse. "On the surface, this would seem to be a very optimistic report for the treatment of a hopeless disease. Actually, no such optimism is intended or shown by a detailed analysis of our records or confirmed by observation of the patients themselves."

Summarizing, Dr. Gordon said, "The actual fact is that it is very difficult to explain or to interpret these results. Every one of

the tests employed is, to some degree, subjective. The problem would be a much simpler one if we could observe ophthalmoscopic evidence of 'improvement.' No changes in the fundi were expected or observed. These patients are capable of tremendous psychic outbursts with increased retinal function as a result. Many of them can be temporarily improved by large doses of nicotinic acid or other vasodilators. We are not in a position to state just how long certain patients are capable of reacting to such stimuli, chemical or mental, and whether such sustained reactions are harmful.

"Some of the patients had paradoxical results with improvements in one eye and regression in the other. Certainly, such incidences are confusing and impossible to explain as are the three patients who suffered marked visual losses while under treatment.

"Too often, in the past, our hopes have been aroused unnecessarily by new retinitis pigmentosa cures for us to chance another such disillusioning experience. It would be a mistake of the first order for our doctors to rush back to their offices and summon in all of their retinitis pigmentosa cases for the new treatment until much more is known about its merit, length of duration of the improvements if such they are, and ability to maintain such improvements. It would be a tragedy to arouse any enthusiasm in either the patient or the doctor until these questions can be accurately answered. Certainly, from our results to date, this method would seem of very little, if any, practical value."

Summary

1. Retinitis pigmentosa is a degeneration of the retina, involving particularly the pigment epithelium and the rods and cones.

2. It is a hereditary disease, which makes the eugenics problem the most important factor. Because the majority of cases belong in the purely recessive group, the marriage of cousins or other blood relatives is especially to be condemned. The only sure way of prevention is abstinence from procreation by affected individuals.

3. Up to the present time there is no known treatment which is effective in producing any marked improvement in the condition.

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Optical Glass and Eye Protection*

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DESCRIBES protective glasses used to prevent eye injuries from mechanical or chemical sources, and from harmful radiations.

IN using special glasses for eye protection two aspects have to be taken into consideration: (1) the protection against mechanical and chemical injuries and (2) protection against harmful radiation. In the first case it is essential to give a lens the mechanical properties which will make it resistant to an impact; in the second case the lens must have specific absorptive properties for injurious wavebands of the spectrum.

Protection Against Mechanical and Chemical Injuries

The resistance of any glass to an impact can partially be achieved by increasing its thickness. The resistance of any lens can, however, be considerably increased by curvature. In protective lenses, just as in ordinary glasses, lenses with 1.25 and 6 curvatures have therefore been introduced, of which the higher curvature is the preferred one because: (1) the deflection of flying particles is higher; (2) specular reflection is avoided; (3) vision is more accurate, while distortion and chromatic aberration are reduced; (4) curved lenses can be fitted closer to the eye, therefore increasing the protective properties, also more eyelash clearance is available; and (5) curved lenses have less tendency to fog.

To increase the resistance of a glass to an impact, protective lenses are hardened. Practically any glass of good optical qualities

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can undergo such treatment, whether it is clear ophthalmic crown, or a glass with brightness reducing, or absorptive properties.

The hardening process consists of exposing a lens for a given time, depending upon the thickness of the lens and the type of glass, to a temperature of about 1300 degrees Fahrenheit, whereupon it is rapidly cooled by oil or air. This process causes changes in the internal stress relations of the glass due to differential cooling. In the surface layers the stress pattern is directed toward the center of the lens, while in the interior of the glass the direction is opposite. Under the impact of a sharp object an ordinary glass would suffer a penetration of its surface and breakage, while the hardened glass will rather cause a deformation of the hitting object without suffering any marked surface scratching.

A safety lens, to meet government specifications, must withstand the impact of a 7/8 inch diameter steel ball (1.56 oz.) falling from a height of 50 inches, the lens being mounted on a hollow tube with a 1/8 inch thick rubber washer between the lens and the tube. The manufacturers of safety lenses subject their lenses to more severe tests than this, such as dropping a 1½ inch diameter steel ball (9 oz.) from varying heights until either the lens breaks or 120 inches is reached. The impact of the steel ball in this test is far in excess of the government requirements.

With a hardened lens it is possible to stay within reasonable limits of thickness, 3.4 mm. usually, which is about 1.5 times the thickness of ordinary ophthalmic lenses. By hardening, one more important result is achieved: in case such a lens should break, the broken pieces usually have cubic or rectangular forms with smooth edges.

Hardened lenses are used in all cases where the eyes of the worker are endangered by his operations. For the person normally not wearing a prescription it is, of course, easy to be fitted with plano protective glasses. The type of frame and mounting should be determined by the kind of work for which the glasses are needed.

With well fitted metal or plastic frames it is possible to incorporate prescription lenses in safety glasses. Any positive or negative lens, with or without additional cylinders, can be furnished in hardened glass. They are, of course, slightly thicker than ordinary lenses to account for the necessary protection. The standard rule

is that the average thickness of the center and edge of the lens must not be less than 3.2 mm. In a positive lens this would make the center thicker and the edge thinner than 3.2 mm., and in a negative lens the relationship would be the reverse. Empirically it has been determined, however, that lenses of this type possess the necessary margin of safety.

Protection Against Harmful Radiations

Visible light is perceived in the spectral region between roughly 380 and 750 millimicrons. This region comprises the visible spectrum with all its colors which, in combination, makes white light. If visible light of high brightness strikes the eye we may have the impression of glare. We can reduce the amount of light by the use of tinted glasses which reduce the incident brightness. Such brightness reducing glasses may be neutral, due to the fact that they reduce the various wavelengths of the visible spectrum in conformity with the spectral sensitivity curve of the eye, or they may have specific colors varying from bluish to reddish. Presently greenish tints are in preference, as for example in the Rayban and Calobar lenses. In adapting such a brightness reducing glass more or less to the human visibility curve the extent of the spectrum beyond the visible spectral range is also reduced so that the amount of ultraviolet and infrared striking the eye becomes negligible. Of these spectral regions, adjacent to the visible, the near infrared (800–1200 millimicrons) and the near ultraviolet (250–380 millimicrons) seem to have some specific effects on vision.

According to Vogt and his collaborators, at Zurich, cataracts can be induced in rabbits by relatively short exposures to intense radiation in the region between 900 and 1200 millimicrons. They do not, however, appear after prolonged exposure to the same source radiating these wavelengths when the eye is shielded by glass with absorptive properties in this region. The relatively high incidence of cataract among glass blowers attributed to the high heat to which they are exposed is a well-known fact and has been discussed at large in the literature. For industrial purposes various types of glasses with total absorption in the infrared are available.

Of the ultraviolet, we know that especially with mercury vapor lamps damage to the eye can be done by the waveband around 253

millimicrons, causing keratitis and conjunctivitis. Slighter effects of the same nature are also produced by the region between 293 and 313 millimicrons, the erythemal (reddening effect on the untanned skin) region of the spectrum.

We can, however, recognize an effect on the sensitivity of the retinal elements by wavelengths in the region between 285 and 370 millimicrons in dark adaptation tests. Pre-exposure to a white light which is rich in ultraviolet yields dark adaptation curves in which the rod adaptation level is higher than it would be if the eye had been exposed to the same brightness for the same length of time, but with the ultraviolet below 400 millimicrons filtered out by filters of the Noviol or Cruxite type, for instance. The onset of rod adaptation is delayed for one to two minutes or more and, at the final dark-adapted level, about twice as much light is needed for threshold recognition of a stimulus. According to Hecht, a sensitivity change of this magnitude produces a 30 to 50 per cent loss in such functions as visual acuity, range of seeing, contrast discrimination, and frequency of seeing. This was borne out particularly by some war research projects in which it was demonstrated that, by the use of brightness-reducing glasses which also absorb wavelengths below 370 millimicrons, the absolute dark-adapted thresholds were not affected after prolonged exposure to intense sunlight.

Initially it appeared that the action of ultraviolet affects the retinal rods only and that for any practical purposes the rise in the final dark-adapted level of the rods is only of limited importance under extreme circumstances. It can be shown, however, that the sensitivity level of the cones is affected to the same degree that the rods are, under the proper experimental conditions. As soon as the cones are tested for threshold sensitivity while a test patch is presented not against a black background, but against a surround of brightnesses higher than the absolute cone sensitivity level, the cones also show a decrease in sensitivity after pre-exposure to white light rich in ultraviolet.

Using Health Education Tools in an Eye Health Program*

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The author draws from her experience with a state agency in describing the use of films, posters, speakers, newspapers, pamphlets, exhibits and correspondence in informing the public on sight conservation.

"BUT how can you prevent blindness?" The question comes at one from every side! There are many approaches to the problem, such as treatment, research, coordination with health and welfare and medical social service. In this paper we shall consider the pick and shovel, hammer and saw, tools of health education; that is, pictures, posters, speeches, newspaper articles, pamphlets, flyers, movies, exhibits, the printed word and the spoken word. To continue the simile and then leave it—before we pick up our tools we must lay out the plot, clear the ground, study the blueprint, round up a crew of fellow workmen, agree upon what we are going to build and why.

The "involving people in solving problems" definition of health education given us by the United States Public Health Service is brief and workable. Before we can decide which tools to develop to help solve a particular problem, the age, sex, type and interests of the group of people concerned should be considered. Recently in a Baltimore high school there arose the need for authentic eye health information for some students about to be given the Massachusetts Vision Test for the first time. Naturally the first question is "What printed material is already available?" We found that

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what we had to offer the school authorities was not acceptable to them. "Good for teachers and nurses but not for teen-agers," said the health director. "Give us a pamphlet on eyes which is comparable to tuberculosis, cancer and infantile paralysis material." We collected samples of this material and also studied the commercial answers to the school challenge—nutrition, good grooming, and dental leaflets—before we set out to produce a pamphlet on eyes for high school students. We knew that the consumers would know best how to translate ophthalmology into terms to flag teenage interest. So, we submitted our copy not only for medical approval and to a professional advertising volunteer, but also to three high school committees, through their English and art teachers.

This same high school asked the Maryland Society for the Prevention of Blindness for an assembly program, and when we had no suitable posters for them they held a contest of their own and prepared some excellent posters which have been found useful in other situations. The school paper wanted material for news and editorial columns on eye health and so a committee from the staff called at the Maryland Society office to interview the secretary. For this we had a wealth of source material from the National Society.

It must be borne in mind that school health education should be geared to age and class levels and plans must be approved first by school authorities. For example, films were used at the assembly, after approval was given by the visual aids director; and speakers, requested by the county school health director for staff meetings and Parent Teacher Association groups, were approved first and then carefully briefed by the Society and the school health director.

The Press

The problem of clearing the ground, or flagging the attention of the general public, requires a different use of the same tools. The newspaper is freely available to us and is read by everybody. While one need not be a graduate of a school of journalism it *is* necessary to learn a few basic rules. One must learn the definition of news and be careful to distinguish between a feature story, an editorial, the letters to the editor column, a human interest bit, and straight news. Learn the simple mechanical technique of double spacing

your copy. Learn to write brief, simple, straightforward English. Learn to put who, what, where, why, and when into the lead paragraph. Study your local paper for style, policy, and space. Never send the same material to rival papers. Cultivate the city editor and make friends with a feature writer who will soon consider you a source of interesting data and write professional spreads and features for you.

The neighborhood Shopping Guides, primarily vehicles for advertising, will welcome articles about eyes. House organs, labor papers, foreign language papers and county weeklies are channels which an alert prevention worker should not overlook. Personal contact with the editors is good but if one mails in carefully prepared copy, based upon an office scrapbook and painstaking effort, good relationships can be built and much general eye information disseminated with minimum expense and maximum results.

Printed Material

Perhaps no other aspect of the printed-word device is so valuable, however, as one's own bulletin or newsletter. This can be mimeographed, off-set, or printed at varying costs modest enough in price for a limited budget. It may be addressed to a particular group, as *The Field of Vision* is to medical social workers, by the New York Prevention of Blindness Division, or to a general membership, as is the Minneapolis Society's *Bulletin*. We set out to build a membership by publishing a *Newsletter* every other month. It serves also to carry sound prevention of blindness information, since the lead article is always written by an ophthalmologist.

A leaflet, flyer, or pamphlet may be needed; but if it should be thought advisable, one should first consider whether something is already available. Before beginning to write a local pamphlet, we must consider carefully who is being addressed—the young mother, the industrial worker, the farmer? And what do we expect to accomplish by addressing such a special group? We had two specific requests recently—one from eye clinic workers, "How to Take Care of Your Eyeglasses," which would save their time; and another from nurses, who wanted to put a leaflet on "Safeguard Your Baby's Eyes" into the hands of expectant and young mothers. In each

case we were careful to try out the copy on our readers before we went to the printer for his advice on color, size, type, and cost; and first of all it was approved by the standing editorial committee which consists of an ophthalmologist, a public health man, and a business man, all Board members.

Many resources are available for content of a local leaflet or pamphlet. We depend first upon the National Society, then upon professional journals, local ophthalmologists, the great teaching centers and eye clinics, the *Journal of the American Public Health Association*, publications of the optical companies, and other organizations such as the Better Vision Institute, Better Light-Better Sight, research of DuPont, and the local lighting company. It is worth while to build a working file of periodicals and pamphlets as well as a bookshelf. *Health Articles of the Week*—an index to periodical literature on public health, published by the National Health Council—is a good investment. Being on an exchange list with sister societies will pay dividends. There is also a wealth of help for the asking in the "how-to-do-it" field. The last tool we would be without, personally, is *Channels*, published by the National Publicity Council for Health and Welfare Services. The local library is a gold mine of information. Style manuals such as those issued by Yale, or the University of Chicago, John Updike's *Get it Right*, and similar aids will be indispensable when one sits down with pen in hand to write one's own leaflets.

Scientific accuracy is of course our primary concern but it is equally important to ponder emotional tone, style, contrast, and repetition. We need also to consider relationship to the reader, whether we are using fear as a motive, or whether the community affords means for the carrying out of the action we are attempting to prompt. If there be no glaucoma clinic available, for example, why stir up patients? On the other hand, motivation might help to open up facilities for meeting the need that a quiet study has uncovered.

The Maryland Society became aware that neither school nurses nor social workers were using the resources that were available. When we mimeographed a *Directory of Eye Clinics* it was hailed with delight by the most surprising, and surprised, people.

How it is to be distributed is a question which enters into the planning of printed material. Not only the cost, if mailing is contemplated, but the quality of paper, size of the unit, and style of writing will be varied according to whether it is to be given out at a Fair Booth, a Well Baby Clinic, or staff meeting; or whether it is to be mailed to physicians, social workers, or potential supporters.

The method of distribution can also add to or subtract from the effectiveness of printed material.

The bulletin or newsletter is also a method of stirring up opportunities to serve the community, and we found that a careful distribution of bookmarks through school and public libraries was a small key which opened many doors.

Word of mouth and direct personal contact, as well as the letter or "direct mail," are tools which, like a woman's hairpin and scotch tape, have many uses. Rules for good reading habits or hints on lighting can be printed on rental book jackets, office blotters or pay envelopes and bill stuffers. Such devices cost the agency little or nothing, but the public may thus be made conscious of prevention as well as of the agency itself.

Posters

Posters are such a valuable tool that the scarcity of good ones should not discourage us. It is worth while to collect from every source the ones which are available and then go to work locally with scissors and paste pot. Recruit art school and art department volunteers and appeal to advertising men not for free work but to become committee members of the Society. The poster contest is a tried and true device but we must be careful not to "use" school children. The primary purpose should be educational. If the students are first interested and informed concerning conservation of vision, the art work will be valid from the school point of view and very probably more telling for others.

The size of posters will be determined by the use that is planned. Are they for schoolrooms or for a factory bulletin board? The smaller 8 by 10 inch, or 11 by 16 inch size is more likely to be displayed than the larger sizes, and it is easier to handle by mail.

Exhibits and Window Displays

Exhibits and window displays are valuable tools even though they represent hard work and considerable expense. There are innumerable opportunities for utilizing the exhibit—safety council meetings, medical meetings, conventions, institutes, health weeks, better home expositions, teachers institutes, nurses conferences, and county fairs; and once we represent our agency at a few such gatherings, invitations from others will be forthcoming. The table full of tracts and pamphlets is a poor substitute for the exhibit which thought and ingenuity will produce. A good idea is to supplement a table of attractively arranged and carefully selected printed material with two other important items: first, a person in attendance who will encourage questions and be able to answer them; and second, an arresting and informative backdrop geared to the group holding the meeting. For example, at a statewide safety meeting we had a professional sign company make a three-wing panel with an industrial eye hazard motif. Whether it was that huge eye with wheel and smokestack, or the attractive miss presiding at the table, or both, we were rewarded when the news photographer selected our booth and spread his picture of it in the afternoon paper. For Negro Health Week we played up a plaster eye model and samples of vision testing devices—Massachusetts Kit and Snellen Illuminator. For a state health department annual meeting we borrowed the five-panel exhibit from the National Society which so vividly illustrates the coordination of health, welfare, rehabilitation and educational agencies. The Minnesota Society had volunteer ophthalmologists scheduled to man their booth at a state fair, with remarkable success. The tuberculosis society gives chest x-rays at our State Fair, and we are considering a plan for vision testing next year.

Window exhibits attract the man in the street and as a tool for general eye health education, they are worth a great deal of trouble and need not be too expensive. Local lighting companies usually have fine window space. Since they too are selling service and education, both their space and professional staff may be utilized by the prevention of blindness worker. It is not easy to stay away from eyeglasses and goggles to get across an idea, but it can be done. Once we had made allies of a professional advertising agency man

and a professional window trimmer, we found them using sight conservation ideas in some of their other accounts. A paint company client was pleased to have his advertising counsel arrange a window in which "paint goes to school" was the general idea. Another, a savings bank, used "Save Your Eyesight" in a hobby series window display. We cooperated by borrowing two miniature schoolroom exhibits, one as Baltimore schoolrooms are—dark, dirty, and regimented—and the other, as they should be, and tying in the Society, since we are hard at work to improve lighting and color in the local schools.

Radio

Radio is a dazzling new tool for health education which we are likely to neglect or misuse. Time on the air is expensive but radio, like the newspaper, has a public service ideal and by taking the trouble to study the technique and to get acquainted with the executive, we may not only utilize the air waves but win the respect and cooperation of the station staff to such an extent that we will soon be invited to participate. The New York Academy of Medicine has studied and used the radio for years with outstanding success. You may read the proceedings of several of their radio conferences, published by the Columbia University Press, and apply the wisdom to your own uses.

As in the case of the newspaper, one must listen and learn before approaching a station executive. Never ask for the important and expensive evening hours; always offer big names; remember that listeners will be likely to snap off a droning lecture. One is competing with the best entertainment talent in the world. One should tie in with other health programs if possible. For example, we called on our City Health Department's Dr. Ashley who has for years presented a series of professionally written and acted radio health dramas. We did not even have to ask him to include one on eyes. He volunteered to do it. Timing is important, too. We planned Child Health Day and 4th of July interviews, and when, well in advance, we approached the radio program director he was grateful rather than condescending. The fact that a very prominent ophthalmologist was to speak on "Toys That Are Eye Hazards" and a well-known lawyer on "Fireworks and Eyes" pleased the program

director, especially. By listening to women's programs in the morning hours we were able to offer good ideas instead of begging just for time.

Moving Pictures

Suitable eye films are too few and far between. It is possible, however, to build a collection of catalogues and lists. The Florida Council for the Blind has an excellent mimeographed list of selected films and where they may be rented or borrowed. Schools and P.T.A.'s are especially interested in good films and we are joining hands with our safety council and insurance companies group to buy some films and to promote a cooperative schedule of showings. Trailers and shorts can be worked out with your local commercial movie houses, especially the suburban ones. We understand that the Better Light-Better Sight people have another Walt Disney film soon to be released. A general word of caution might be interpolated here. It is easy in generalized eye publicity to plow the ground for charlatans—to leave the impression, for example, that eyeglasses prevent blindness. One must guard against the too popular and against playing upon fear.

Increasing skill in the use of all the tools of health education—films, posters, speakers, newspaper articles, flyers, pamphlets, exhibits, letters, bulletins—comes only from alertness, real study, and much cooperation with professionals in each field. One should not sit back and wait for an invitation to speak, show a film, or display an exhibit. There are many dignified ways to suggest cooperation. Attending the meetings of other agencies, and making a news-story peg out of one meeting or service to flag down others, are two good devices. It is imperative to integrate prevention of blindness with all other phases of public and private health education. Taking careful aim at a particular group and asking oneself frequently, "What am I trying to get whom to do about what?" is likewise advisable. And last of all, it can be fun to "close the wide gap," as Ira V. Hiscock says, "between scientific knowledge and the application of this knowledge to daily life"—an excellent definition of health education.

The Forum

THIS section is reserved for brief or informal papers, discussions, questions and answers, and occasional pertinent quotations from other publications. We offer to publish letters or excerpts of general interest, assuming no responsibility for the opinions expressed therein. Individual questions are turned over to consultants in the particular field. Every communication must contain the writer's name and address, but these are omitted on request.

Relationships of the Voluntary Health Agencies to the School Health Program

Editor's Note.—This is an excerpt of a statement prepared for the School Health Section of the American Public Health Association and approved by the School Health Section Council of the American Public Health Association. As one of the voluntary health agencies concerned with school health, the National Society for the Prevention of Blindness feels the validity of the principles propounded in the statement, and urges its consideration by everyone concerned with the eye health of school children.

A. *Guiding Principles.*—In interrelationships between voluntary health agencies and the schools, the following principles should be accepted:

1. School authorities have the legal responsibility for all school programs. The unique function of the school is education.

2. Voluntary health agencies accept this. They also recognize that school age is an excellent learning age. Moreover, their money comes from the community with the trust that it be spent to the best advantage. For these three reasons they strive, logically, to have what they consider important learning material included in this age period. School administrators should recognize that voluntary health agencies have the responsibility and the right to offer and to urge the use of their services. Voluntary health agencies should recognize that the school authorities have the choice of accepting or refusing these services. A cooperative attitude on the part of both parties leads to the most effective use of the services offered.

3. It is very desirable that personnel working with the schools in any phase of education for health be acquainted with the problems of school administration and classroom instruction and should have an understanding of acceptable policies and practices in health education.

4. While voluntary health agencies may contribute to any part

of the school health program their most valuable services are usually in the field of health instruction.

5. All efforts in the health instruction of children in school must be channeled through the regularly constituted educational authorities, in cooperation with any other agencies which may also be concerned. This should apply to any situation whether on the federal, state, or local level.

6. The voluntary health agency should never attempt to superimpose a fixed plan on any individual school system, or part of the system, but should work with school personnel for the desired goal.

7. Health education materials offered by voluntary health agencies for the elementary grades must be in harmony with the mental and emotional stage of development of the children concerned. Only those public health problems which touch the child's daily health practices, such as the use of quarantine in the control of communicable diseases in children, come within his range of interest and understanding. Learning experiences which have direct bearing on his personal health are basically important for these grades. The child in these years is interested in health, not disease.

8. In the secondary schools education related to special diseases or special health problems should be integrated into the health course and into such general courses as human biology and general science. It is not acceptable educational practice that programs dealing with specific health problems such as nutrition, cancer, tuberculosis, venereal disease, and first aid be set up as a separate or extra subject. So isolated, one aspect of health has little or no chance of assuming its proper place in the individual's total health learning.

9. The voluntary agency must have a clear understanding with the educational authorities as to suitability and distribution to school personnel of materials they provide. Sound educational policy involves mutual agreement that the provision of educational materials to schools by voluntary agencies be kept separate from their direct fund-raising campaigns.

10. The voluntary health agency should be familiar with the extent and quality of the teacher's education in health.

B. *Aid Which Voluntary Agencies Can Give.*—The types of aid acceptable to school authorities which voluntary agencies can give to the school health program are:

1. Up-to-date, accurate information on the agency's special health interests. Such assistance should be not only welcomed but asked for by school personnel, who cannot expect to be able to keep up with all phases of the rapidly increasing health knowledge.

2. Teaching tools, as pamphlets posters, charts, graphs, films, film strips and slides, exhibits. Such material must be accurate, clear in concept, attractive, and effective, with its purpose solely educational.

3. Suggested teaching units. It is recommended that in the preparation of teaching units the voluntary health agency make use of experienced teachers so that the material

is adjusted properly to grade levels and needs.

4. Consultation services.

5. Personnel assigned to educational authorities to work under their jurisdiction.

6. Assistance in the formation of school health councils and coordination of the school health councils with the community health council.

7. Qualified personnel provided to demonstrate a health education program or part thereof, to experiment in new types of programs or to fill the temporary lack of adequate school personnel.

8. Cooperation in the in-service course in health education either in the form of funds or personnel. Such courses should be developed cooperatively with school authorities, especially those having to do with teacher preparation and certification.

9. Scholarships for education in health education.

10. Financial assistance and/or leadership in special projects, such as workshops.

11. Individual conferences with teachers possibly including demonstration teaching of selected health units by a qualified health educator.

12. Guidance in helping teachers to understand classroom observations and/or measurements, nondiagnostic or non-medical in nature, and to be alert to detect and refer children with signs of impaired health.

13. Guidance to teachers or parents in learning the use of nonmedical, nondiagnostic screening tests, such as vision and hearing testing, and weighing and measuring.

14. Educational presentations to classroom groups, supplementary or summarizing in nature. These are not to take the place of classroom teaching, which is not to be provided by the voluntary agency except for possible demonstration teaching of a health lesson.

15. Parent health education.

16. Leadership in parent or teacher study groups.

17. Informing school administrators and teachers of general advances in health knowledge and practice.

18. Securing the interest and cooperation of other community groups to participate in the school health program, e.g., conferences and medical and/or educational presentations for teacher groups.

19. Interpreting school health program and unmet needs to the community and stimulating action if desirable.

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and

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Note and Comment

Annual Meeting.—The thirty-fourth annual meeting of the National Society for the Prevention of Blindness will be held at 4:00 P.M. on Thursday, December 9. Reports of the activities of some aspects of the Society's program will be given by committee chairmen, and official business to come before the membership will include the election of directors. A cordial invitation is extended to anyone who is interested in attending.

National Society to Hold Three-day Conference.—The next conference of the National Society for the Prevention of Blindness will be held in New York City, March 16, 17 and 18, 1949, at the Hotel New Yorker. Plans are made for exhibits of commercial and educational displays in the mezzanine of the hotel adjoining the Grand Ballroom and other rooms where conference sessions will be held. Prevention of blindness workers from all parts of the country expressed an interest in meeting in New York for this conference. Among the speakers will be leaders in the fields of public health, medicine, education, social work and industry. For hotel reservations address: Sales Department, Hotel New Yorker, 34th Street at 8th Avenue, New York 1, N. Y. Inquiries regarding exhibit space may be addressed to Miss Florence Nelson, the Society's acting director of films and exhibits.

New Drug Found for Eye Infections.—Aureomycin, one of the newer antibiotic drugs, produces excellent results against several kinds of conjunctivitis, the most common type of eye infection, say two New York physicians. Writing in the October 1, 1948, issue of *The Journal of the American Medical Association*, Alson E. Braley, M.D., and Murray Sanders, M.D., of the Departments of Ophthalmology and Bacteriology, Columbia University College of Physicians and Surgeons, New York, describe the use of aureomycin for eye diseases on 100 patients. The physicians applied aureomycin in solution to the eyes of all these patients. In a few cases they also gave injections of the drug. Of the patients, 96 had conjunctivitis, and results of treatment with aureomycin in most

of these cases were excellent. Aureomycin is also effective against some eye ulcers, the physicians found. The drug irritated the eyes of patients "only occasionally" and apparently produced no allergies or toxic effects, they say.

National Health Council Appoints New Executive.—Announcement has been received of the appointment of Thomas D. Dublin, M.D., Dr.P.H., as executive director of the National Health Council, of which the National Society for the Prevention of Blindness is a member. Dr. Dublin comes to the Council from the Long Island College of Medicine, Brooklyn, where he has served during the past six years as professor of preventive medicine and community health.

The announcement also reported that the Rockefeller Foundation had made a grant to the National Health Council of $225,000 to be used over a three-year period in its program of strengthening the public health movement throughout the United States.

"Dr. Dublin's appointment," Philip R. Mather, president of the Council, stated, "climaxes an extensive search for a qualified executive to guide the Council's expanding activities. With its membership of 23 leading national health agencies, both voluntary and governmental, the Council holds a place of leadership in the public health field. For more than 25 years it has brought together the steadily increasing number of specialized organizations working to improve individual and public health.

"Under Dr. Dublin's direction, the Council seeks to stimulate the provision of adequate public health services of high quality for all the population of the country."

The Council's current program emphasizes the enlistment of more active participation by the public, in partnership with professional workers, in the field of public health. It is at present engaged in helping local professional and citizen groups in their attempts to bring about full-time, professionally staffed, health departments where they do not exist, and to strengthen the health services of existing departments. The Council's staff is also working with local groups and individuals engaged in forming community health councils. These local bodies bring together all interested organizations to plan for community health.

New Pamphlet on Cross Eyes.—REVIEW readers will be interested in a new pamphlet called "A Brochure for Parents," containing information for parents of cross-eyed children. This is an 8-page publication, approved by the publications committee of the American Orthoptic Council, and is issued by the American Association of Orthoptic Technicians. Through answers to a series of 16 questions, and a statement on parents' responsibility, the pamphlet succeeds in presenting in very clear language the facts about orthoptic training and the problems involved. Inquiries regarding the availability of the publication may be addressed to the editor, Miss Mary Argue, Wilmer Institute, The Johns Hopkins Hospital, Baltimore, Maryland.

President's Conference on Industrial Safety.—The President has called a conference on industrial safety which will be in two parts. The organization meeting was held September 27, 28, and 29 for the purpose of establishing scopes, objectives, committee organization and procedure for the seven technical committees which will study and analyze the problems within their respective scopes and provide reports and recommendations for consideration by the members of the spring conference. The committees are as follows: "Accident, Records, Analysis, and Use," Ewan Clague, chairman; "Engineering," James E. Trainer, chairman; "Laws and Regulations," Almon E. Roth, chairman; "Education," Richard A. Lester, chairman; "Labor-Management Cooperation for Safety," Harold C. Zulauf, chairman; "Programs and Services," Fred W. Braun, chairman; and "Research," Dr. William P. Yant, chairman. It is expected that sight conservation in industry will be among the aspects of safety considered. The National Society for the Prevention of Blindness is represented through the appointment of its consulting engineer as a member of the Committee on Engineering.

Consultant in Education Appointed.—The National Society for the Prevention of Blindness announces the appointment of Miss Marjorie A. C. Young, M.Ed., M.P.H., as consultant in education. It is expected that Miss Young will carry on the Society's eye health program with colleges and other teacher preparation institutions, among other activities.

Current Articles of Interest

The Corneal Lens—A New Type of Plastic Contact Lens, Maurice W. Nugent, M.D., *Annals of Western Medicine and Surgery,* June, 1948, published monthly by The Los Angeles County Medical Association, 1925 Wilshire Blvd., Los Angeles 5, California.

Dr. Nugent presents a preliminary report on a new type of plastic contact lens which requires no accessory fluid and consists of a corneal part only. This new lens represents two years of research in the field of contact lenses. Although clinical investigation so far involves only 12 cases of the higher degrees of ammetropia, the results are sufficiently promising to warrant this report.

The contact lens, currently prescribed, interferes with the physiologic processes of the eye, resulting in discomfort within two to three hours. The new corneal lens, made from "Lucite" plastic rod, permits the fluid to circulate freely and replace itself continuously. The patient's tears are the only fluid required. The corneal lens is held in position by capillarity and surface tension of the tears. Other advantages include the ease of measurement and fitting of this lens to the cornea and its limitless wearing time.

Dr. Nugent states that this lens appears to be a definite advance in contact lenses for ammetropia but that further investigation is necessary especially in connection with the use of the plastic corneal lens in conical corneas and other pathologic conditions of the cornea.

Give Safety a Shot of Color, C. H. Cole, *Safety Engineering,* September, 1948, published monthly by Alfred M. Best Company, Inc., Albany, New York.

Mr. Cole of the E. I. du Pont de Nemours Company, Inc., in Houston, Texas, urges the adoption throughout industry of a uniform safety color code, which has been developed on the basis of a study of functional color and its psychological reactions by paint companies, safety organizations, and color consultants. Six basic colors were recommended: yellow for strike against, stumbling, or falling hazards; green for safety equipment; orange for machine

hazards; red for fire-fighting equipment; blue for caution; and white for good housekeeping.

Summarizing how the safety color code can improve safety records in industry, the author lists the following points:

"1. Employ few colors, each distinct and readily recognized.

"2. Establish specific and uniform meanings for each color.

"3. Provide ready identification of hazard or safety equipment.

"4. Reduce to a minimum the effort required to learn and retain the color meanings.

"5. Readily identify and locate fire protection and safety equipment.

"6. Encourage good housekeeping."

A Bacteriological Comparison of Penicillin and Silver Nitrate for Prophylaxis Against Ophthalmia Neonatorum, Surgeon H. Charles Franklin, U.S.P.H.S., *The Military Surgeon*, March, 1948, published monthly by the Association Military Surgeons of the United States, 450 Ahnaip Street, Menasha, Wisconsin.

The author presents the following summary of the findings obtained in a study of ocular abnormalities occurring after each method of prophylaxis:

"The results obtained in the study of 190 cultures are reported. Cultures were taken from infants exhibiting pus in the eyes after penicillin prophylaxis and after silver nitrate prophylaxis. This was done both in the nursery and in the home. Fifty infants who showed ocular abnormalities other than the presence of pus were studied after each method of prophylaxis.

"Two and one-tenth per cent of the infants exhibited pus in the eyes while in the nursery after penicillin prophylaxis, and the cultures were positive in 80.0 per cent of these. After silver nitrate prophylaxis, 6.0 per cent of the infants exhibited pus in the eyes while in the nursery, and the cultures were positive in 37.8 per cent of these.

"Fifty-two per cent of the cultures were positive of the 50 infants studied who exhibited ocular abnormalities other than pus after penicillin prophylaxis. This same percentage of 52.0 was found in the group of 50 infants studied after silver nitrate prophylaxis.

"After penicillin prophylaxis and during the first two weeks of

life, 3.1 per cent of the infants exhibited pus in the eyes at home. Of the cultures taken of these infants, 93.3 per cent were positive. After silver nitrate prophylaxis, 2.4 per cent exhibited pus in the eyes at home, and 100.0 per cent of the cultures taken of these infants were positive.

"The gonococcus was found in one instance after silver nitrate prophylaxis but was not found in any known instance after penicillin prophylaxis."

The Use of Hydrosulphosol (Sulphydryl) in the Treatment of Chemical and/or Thermal Burns of the Eyes, Hedwig S. Kuhn, M.D., *Industrial Medicine*, September, 1948, published monthly by Industrial Medicine Publishing Company, 605 North Michigan Avenue, Chicago 11, Illinois.

Dr. Kuhn provides the following conclusions regarding the use of Hydrosulphosol in treating chemical and thermal burns of the eyes:

"More than 300 major chemical and thermal eye burns have been treated with a sulfhydryl-bearing product, Hydrosulphosol, over a period of the past three years with results deemed to be vastly superior to those observed during previous years when other approved methods were used.

"2. Results observed include ability to control pain at all times, produce faster healing and effect recovery with less impairment of vision as a permanent disability and fewer occasions where conjunctival flaps were needed or contractures resulted.

"3. The use of this material was based on its apparent value as a specific treatment for eye burns because of its chemical composition and an indicated ability to stimulate healing functions related to biochemical aspects of the structure of this particular organ.

"4. The simplicity of technique adds to its attractiveness.

"5. Its use in eye injuries due to anhydrides and detergents has shown a similar experience."

Surgery of Congenital Cataracts, Frederick C. Cordes, M.D., *American Journal of Ophthalmology*, September, 1948, published monthly by the Ophthalmic Publishing Company, 664 North Michigan Avenue, Chicago 11, Illinois.

In a discussion of surgery of congenital cataract, the author states that 50 per cent of the patients have other ocular congenital defects so that prognosis must be guarded. Generally, visual acuity of 20/40 contraindicates surgery since the wearing of heavy lenses is itself a handicap to the child. In cases of bilateral congenital cataract where opacities interfere with the development of fixation, the first eye should be operated upon at six months, and the second eye between the second and fourth year. Cataracts should be operated upon before school age when they interfere with the child's learning to read.

Dr. Cordes points out that only about 50 per cent of the cases develop a postoperative vision of 20/100 or better, which should be borne in mind when discussing congenital cataract surgery with parents. His operation of choice in soft congenital cataract is the linear extraction as modified by Otto Barkan. The modifications are the injection of adrenalin (1:1,000) at the limbus at the site of the incision; and making the incision parallel to the iris surface and 1 to 2 mm. inside the cornea. The author emphasizes the importance of a deep anterior chamber when the patient leaves the operating room.

In rubella cataract, Dr. Cordes states that it should be remembered that the absorption of the lens substance is slower than that of the usual congenital cataract and that, usually, it is difficult to dilate the pupil with mydriatics.

Dr. Cordes stresses the importance of a thorough knowledge of the types of congenital cataracts together with a detailed study of the individual case before making a decision as to whether or not surgery is indicated. When surgery is indicated, this knowledge aids in determining at what age it should be done and the appropriate surgical procedure to be used.

Solar Retinitis Due to Exposure During Eclipse, Paul Tower, M.D., *Annals of Western Medicine and Surgery*, May, 1948, published monthly by The Los Angeles County Medical Association, 1925 Wilshire Blvd., Los Angeles 5, California.

Dr. Tower reports eight cases of solar retinitis occurring in children due to exposure to the sun during the eclipse of November 12,

1947. The thermal lesion in solar retinitis always appears in the area of the macula lutea, which is that part of the retina where vision is clearest. The symptoms include: persistent afterimage; positive scotoma; and metamorphopsia (distorted vision).

The author cites the work of F. C. Cordes, M.D., who reported on 28 cases following the same eclipse. Dr. Cordes found that appreciable changes in the fundus continued in only two cases, while vision had returned to normal in all other cases at the end of two weeks.

Dr. Tower's summary states:

"1. Eight cases of solar retinitis, due to exposure during a recent eclipse of the sun, are reported.

"2. In all children the damage proved to be irreversible, and after a lapse of several months vision had not returned to its previous state.

"3. The most recent literature on the subject is reviewed.

"4. Neither smoked glasses nor photographic film afford sufficient protection for observing an eclipse.

"5. Ordinary sun glasses, when used for looking into the sun, transmit infra-red rays.

"6. The incidence of solar retinitis decreases with advancing age; school children are, therefore, most likely to experience macular injury following observation of an eclipse.

"7. Prevention of permanent and irreversible damage to the eyes of children due to solar retinitis is the responsibility of parents, teachers, and doctors."

The Problem of Sympathetic Ophthalmia, Bernard Samuels, M.D., *American Journal of Ophthalmology*, April, 1948, published monthly by the Ophthalmic Publishing Company, 700 North Michigan Avenue, Chicago 11, Illinois.

Presenting the problem of sympathetic ophthalmia, Dr. Samuels first describes it as a bilateral disease which breaks out first in one eye when the external tunic has been penetrated, called the exciting eye, and then in the uninjured eye, called the sympathetizing eye. The causative agent has never been identified with certainty. Anatomically, this disease is characterized by the appearance of an

infiltration in the pigmented and vascular uvea. This infiltration is composed of lymphocytes, epithelioid cells, and giant cells, and is known as the specific infiltration of sympathetic ophthalmia.

Among the many aspects of this disease included in Dr. Samuels' discussion are: anatomic similarity and difference between sympathetic ophthalmia and tuberculosis; clinical signs of sympathetic ophthalmia; pathogenesis of sympathetic ophthalmia; and prognosis and treatment.

Management of Chemical Burns of the Eyes, William F. Hughes, Jr., M.D., *The Eye, Ear, Nose & Throat Monthly,* May, 1948, published monthly by The Professional Press, Inc., 5 N. Wabash Ave., Chicago 2, Illinois.

Dr. Hughes divides chemical burns of the eyes into three groups on the basis of prognosis: nonprogressive (acids); progressive (alkalies, vesicant war gases, and others); and irritant (lacrimators). In cases of acid burns, prognosis can be made fairly accurately at the time of injury since unexpected secondary complications do not usually follow. However, in alkali burns of the eyes the initial damage may be relatively small, followed later by serious secondary complications.

Methods of treatment are discussed including decontamination, irrigations, and neutralizing solutions. Complications resulting from chemical burns of the eyes are iritis, secondary infection, and symblepharon (adhesion of the eyelids to the eyeballs).

Dr. Hughes provides the following summary:

"The emergency treatment of toxic chemical burns of the eye consists of immediate irrigation of the eye with copious amounts of water or any bland fluid, followed by the use of neutralizing solutions for several hours. A mydriatic should be instilled soon after the injury and continued as long as iritis persists. After 24 hours has elapsed instillations of penicillin solution should be started prophylactically. Local anesthetics and most of the sulfonamide compounds should be used sparingly. Experimentally, repeated paracenteses, a Denig-type of graft or the use of beta irradiation may be tried. In selected cases of old burns, superficial keratectomy or keratoplasty may be indicated."

The Effect of Rhinoplasty on the Refractive Error, Matthew S. Ersner, M.D., F.A.C.S., F.I.C.S., Maurice H. Alexander, M.D., F.I.C.S., and Bernard C. Gettes, M.D., *The Eye, Ear, Nose & Throat Monthly*, October, 1948, published monthly by The Professional Press, Inc., 5 North Wabash Avenue, Chicago 2, Illinois.

The authors classify the aftereffects of rhinoplasty (a plastic operation upon the nose) on the eyes in three groups: traumatic effects; cosmetic effects; and the effects on the visual physiology of the eyes. Four cases are presented which demonstrate that the effectiveness of a convex lens is increased the farther it is from the eye; and the effectiveness of a concave lens is decreased the farther it is from the eye.

The following conclusions are provided:

"1. Rhinoplasty does not cause any anatomical ocular changes.

"2. Reduction of a large humped nose increases the nasal field of vision.

"3. The effectivity of the patient's corrective lenses is altered in that the distance of the lenses from the cornea is changed by surgical correction of the malformation.

"4. Severe myopics [nearsighted persons] should never have a saddle nose corrected without the prospect of having to wear greater refractive lenses.

"5. Severe hypermetropics [farsighted persons] should never have a hump nose corrected for the same reason.

"6. The importance of measuring the distance of strong lenses between the back surface of the lens and the cornea is emphasized to ophthalmologists especially where external deformities of the nose are to be changed."

Dacryocystitis of Infancy, J. V. Cassady, M.D., *American Journal of Ophthalmology*, July, 1948, published monthly by the Ophthalmic Publishing Company, 664 North Michigan Avenue, Chicago 11, Illinois.

The author reviews the literature on dacryocystitis (inflammation of the lacrimal sac) of infancy, discusses embryology and developmental anatomy, incidence of the disease, and method of treatment together with his results in 100 cases.

Dr. Cassady summarizes his report as follows:

"1. Tears start to form and appear at about 3½ weeks of age.

"2. The incidence of dacryocystitis in infancy is somewhere between 1.75 and 5 per cent.

"3. Prompt subsidence of dacryocystitis can be obtained as soon as the lumen of the duct is adequately patent.

"4. Early probing of the duct produces no untoward injury providing it is carefully and gently done.

"5. Early probing of the nasolacrimal duct in infants is the method of choice for prompt subsidence of symptoms."

Glaucoma Following Cataract Extraction, William Councilman Owens, M.D., *Southern Medical Journal*, April, 1948, published monthly by the Southern Medical Association, Empire Building, Birmingham 3, Alabama.

Reporting on 87 cases of postoperative glaucoma, Dr. Owens provides the following conclusions:

"1. Glaucoma following cataract extraction is almost always secondary to some complication that has occurred during the operation.

"2. The most frequent complications associated with secondary glaucoma are postoperative iridocyclitis; delayed or nonreformation of the anterior chamber; incarceration of iris, vitreous or capsular material in the operative incision; inadequate opening between the posterior and anterior chambers; and epithelial downgrowth.

"3. The complications which precede postoperative glaucoma can be avoided by utilizing certain operative techniques, among which are adequate anesthesia, the use of a conjunctival flap and corneoscleral sutures, preservation of a round pupil with an adequate peripheral iridotomy or iridectomy, the intracapsular extraction of the lens, and the careful removal of all extraneous material from the incision.

"4. The treatment of glaucoma following cataract extraction varies with the cause. Medical treatment alone maintained the tension at or below 30 mm. of mercury (Schiotz) in 37.9 per cent of the cases reported. The most satisfactory operation to provide additional absorption for the intraocular fluid in aphakic glaucoma is cyclodialysis.

"5. Only 39.5 per cent of the cases with glaucoma after cataract extraction obtained good vision (20/70 or better)."

Penicillin in Drops for Prophylaxis Against Ophthalmia Neonatorum, H. Charles Franklin, M.D., *Southern Medical Journal*, April, 1948, published monthly by the Southern Medical Association, Empire Building, Birmingham 3, Alabama.

Penicillin in drops as a prophylaxis against ophthalmia neonatorum has proved effective when a method of multiple instillation is used. In this study, Dr. Franklin evaluates the use of only one instillation of penicillin.

Summarizing, Dr. Franklin states:

"A single instillation of penicillin in drops for prophylaxis against ophthalmia neonatorum is evaluated. A total of 1,177 infants was studied in the nursery and in the home during the first two weeks of life.

"One and one-tenth per cent of the infants exhibited pus in the eyes while in the nursery. This percentage is approximately one-half of that observed when a multiple instillation method was used under less favorable conditions. . . . , and is approximately one-sixth the incidence observed in a previously reported series following silver nitrate prophylaxis."

Book Reviews

CLINICAL PHYSIOLOGY OF THE EYE. A. Magitot. Paris: Masson and Co., 1946. 458 p., 235 illustrations.

This comprehensive and scholarly treatise was written during the war years by one of the leading ophthalmologists in France. It brings up to date the basic work done both in Europe and America, upon which the knowledge of eye diseases rests. Professor Magitot has devoted his life to the study of the circulation of the fluids of the eye in an effort to solve some of the problems involved in the management of glaucoma. In his approach to the disease, he lays due emphasis on the emotional, glandular and circulatory aspects of the entire body. This approach offers some hope for an eventual solution of the glaucoma problem.

ADOLPH POSNER, M.D.,
New York, N. Y.

PATHOLOGIC PICTURES OF THE FUNDUS OF THE EYE IN DISEASES OF THE RETINA (Ophthalmoscopic Atlas). Gabriel Renard. Paris: Masson and Co., 1946. 170 p. 32 colored plates.

This is the first ophthalmoscopic atlas published in France since the war. The 32 plates contain nearly 70 beautifully executed colored paintings of the fundus, or background, of the eye. Various common and rare disease conditions are depicted. Such an atlas is always a welcome addition to the eye literature, particularly when it is of high artistic merit as is true of this book.

ABRAHAM SCHLOSSMAN, M.D.,
New York, N. Y.

HOW TO CONQUER YOUR HANDICAPS. Marie Beynon Ray. Indianapolis: The Bobbs-Merrill Company, 1948. 336 p.

The aim of the author of this very informative and equally interesting and inspiring book is to acquaint those whose need is greatest with advances in medical science, operative techniques and inventions that may aid them in conquering their handicaps.

Naturally, emphasis is laid on prevention with recommendation for medical treatment and rehabilitation for those already handicapped.

The author's method of approach to the problem is perhaps the greatest factor in holding the attention of the reader to the very last page. She does not tell about the doctor, the research worker, the inventor, but takes the reader with her into the doctor's consultation room so that he may hear from the physician himself of the wonders of medical and surgical advances; into the laboratory so that he may realize and appreciate the infinite patience and care necessary in order to obtain results; into the hospital where the first steps are taken toward rehabilitation; into the rehabilitation workshops where the actual training takes place; and, perhaps most important of all, into the lives of those who, suffering from nonremediable handicaps, have developed their other latent powers to the full—a Beethoven, a Milton, a Byron, an Edison, a Roosevelt. She tells of cripples who walk, nay run and dance, of the deaf who hear, of the blind who see, of those whose unrecognizable faces have been restored to human likeness through plastic surgery.

However, throughout the book, the author emphasizes the importance of the individual's will to do in making the handicap a springboard to success through the development of latent powers and through the triumph of the human spirit.

WINIFRED HATHAWAY